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Remarks

Upon entry of this amendment, claims 1-16, 18-32, and 34-50 will be pending in the application.

Claim 1 has been amended to more clearly define that the cooling passages are located within the interior of the roll core. Claims 16 and 31 have been amended to recite that there is at least one inlet cooling passage and at least one outlet cooling passage located within the metal overlay that extend substantially parallel to the central longitudinal axis of the roll core. Amended claims 16 and 31 also recite that the inlet cooling passage is in fluid communication with the outlet cooling passage. Claims 2-15, 18-30, 32, and 34-50 remain unchanged. Claims 17 and 33 have been canceled.

Paragraph 59 of the Applicants' application supports the amendment to claim 1 by stating that "the embodiment of the caster roll 10 wherein the cooling passages 34 are provided in the roll core 12 is discussed in connection with FIG. 16 later in this disclosure." Paragraph 75 states that "in FIGS. 16, the cooling passages 34 are now formed within the roll body 18 instead of the first metal overlay 14. Accordingly, the entire fluid flow path for the cooling water is located within the roll core 12." Further support for the amendment to claim 1 is found in paragraph 76 which states that "in general, the embodiment of the caster roll 10 shown in FIG. 16 is substantially similar to the embodiments of the caster roll 10 having discussed previously having one metal overlay (i.e., first metal overlay 14) and two or more metal overlays (i.e., first and second metal overlays 14, 16), except that the cooling passages 34 are now formed within the roll

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body 18 instead of in the first metal overlay 14. The cooling passages 34 and radial passages 30 are formed in the same manner as described previously, for example by drilling longitudinally into the roll body 18 to form the cooling passages 34 and radially into the roll body 18 to form the radial passages 30." As stated in paragraph 56 and as depicted in FIG. 5 of the Applicants' application, the roll body 18 is part of the roll core 12. Further support for the amendment to claim 1 is found in FIG. 16 which depicts the cooling passages 34 as being located within the interior of the roll body 18 of the roll core 12. Paragraph 11 states that "the roll core has a central longitudinal axis and defines a plurality of longitudinally extending cooling passages for conducting a cooling medium through the roll core to cool the roll during use."

The amendment to claims 16 and 31 are supported in paragraph 77 of the Applicants' application. Paragraph 77 states that "the cooling water then flows longitudinally the length of the first metal overlay 14 (or roll body 18) through the "inlet" or "supply" cooling passages 34. Once reaching the end of the respective inlet cooling passages 34, the now heated water flows back the length of the first metal overlay 14 (or roll body 18) through the respectively interconnected "outlet" or "return" cooling passages 34, which are in fluid communication with the outlet passages 28a, 28b through the "return" radial passages 30. In summary, the heated water flows back the length of the first metal overlay 14 (or roll body 18) through the outlet cooling passages 34 and into the return radial passages 30." Further support for the amendments to claims 16 and 31 are found FIGS. 2-4, 11-13 that show the cooling passages 34 extending substantially

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parallel to the central longitudinal axis of the roll core 12. Additional support for the amendments to claims 16 and 31 is found in paragraph 15 of the Applicants' application that states that "the metal overlay defines a plurality of cooling passages for conducting a cooling medium through the metal overlay to cool the roll during use. The cooling passages may extend substantially parallel to the central longitudinal axis of the roll core and longitudinally in the metal overlay, preferably substantially the entire length of the metal overlay." Because there is support for the amendments in both the drawings and the specification, no new matter issue is presented.

#### Summary of Rejections and Objections

Claims 1-7 stand rejected under 35 U.S.C. 102(b) as being anticipated by Frischknecht et al. (U.S. Patent 4,934,444). Claims 16-22, 30-38 and 47-48 and 50 stand rejected under 35 U.S.C. 102(b) as being anticipated by Perry et al. (U.S. Patent 5,651,410). Claims 8-9, 11-12 and 14-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Frischknecht in view of Griffon et al (U.S. Patent 6,527,042). Claims 10 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Frischknecht in view of Griffon and further in view of Hawes et al (U.S. Patent 5,279,535). Claims 23-24, 26-27, 29, 39-40, 42-43 and 45-46 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Perry in view of Griffon. Claims 25, 28, 41 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perry in view of Griffon and further in view

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of Hawes. Claim 49 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Perry in view of Fukubayashi et. al (U.S. Patent 4,822,689).

### Legal Precedent Regarding 35 U.S.C. §102

Before addressing the rejections under 35 U.S.C. § 102, the Applicants would like to respectfully address legal precedent regarding § 102. In *Minnesota Mining & Mfg. Co. v. Johnson & Johnson*, 976 F.2d 1559 (Fed.Cir.1992), the Court held that "under 35 U.S.C. § 102, anticipation of a patent claim must be proven by showing that each element of the claim in issue is found, either expressly or under principles of inherency, in a single prior art reference". Furthermore, the Court in *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264 (Fed.Cir.1991) held that "to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient". Finally, in *Ex Parte Levy*, 17 USPQ2d 1461 (Bd. Pat. App. & Inter. 1990), the Board held that "in relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teaching of the applied prior art."

**Rejection of Claims 1-7 under 35 U.S.C. 102(b)**

In paragraph 2 of the Office Action, the Examiner has rejected claims 1-7 under 35 U.S.C. 102(b) as being anticipated by the Frischknecht '444 patent. Claims 2-4 depend from claim 1 and claims 5-7 depend from claim 4, which depends from claim 1. As amended, Applicants' claims 1 recites "a cylindrical roll core having a central longitudinal axis and defining a plurality of longitudinally extending cooling passages for conducting a cooling medium through the roll core to cool the roll during use, the cooling passages being located within the interior of the roll core; and at least one metal overlay formed on the roll core."

In contrast to Applicants' amended claim 1, the Frischknecht '444 patent discloses the cooling grooves as being located on the exterior surface of the roll core. This configuration is seen in FIG. 6 of Frischknecht, which shows the cooling grooves 78 as being on the exterior surface of the roll core 66. Column 4, lines 65-68, of Frischknecht state that "the cooling medium is carried radially into the surface area in a closed loop, where it is guided in circumferential cooling grooves 74 in roll core 66, delimited by roll jacket 68." Even though column 4, lines 65-68, refer to FIG. 5 that has circumferential cooling grooves, column 5, lines 1-2, recite that "in contrast to FIG. 5, in FIG. 6 cooling grooves 78 run axially and utilize the countercurrent principle." Unlike the exterior surface of the roll core in the Frischknecht '444 patent, the exterior surface of Applicants' roll core/roll body is smooth. In paragraph 58 of the Applicants' application it is stated that "the surface 31 of the roll body 18 is preferably free of grooves and channels, such as

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those that are generally found in prior art caster rolls. The first metal overlay 14 is formed on top of the relatively smooth surface 31 (i.e. free of grooves and channels) of the roll body 18." Because the Frischknecht '444 patent discloses the longitudinal running cooling grooves as being located on the exterior surface of the roll core as opposed to Applicant's amended claim 1 that recites the cooling passages as being located within the interior of the roll core, Applicants respectfully submit that amended claim 1 and claims 2-4 that depend from amended claim 1 and claims 5-7, which depend from claim 4 that depends from claim 1, are patentable over the prior art of record.

**Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b).**

In paragraph 3 of the Office Action, the Examiner has rejected claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b) as being anticipated by the Perry '410 patent. Claims 17 have been canceled. Claims 18-20 and 30 depend from claim 16 and claims 21-22 depend from claim 20, which depends from claim 16. As amended, Applicants' claims 16 recites "a cylindrical roll core having a central longitudinal axis; a metal overlay formed on the roll core, the metal overlay defining a plurality of cooling passages for conducting a cooling medium through the metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core."

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Claim 33 has been canceled. Claims 32, 34-36, 47 and 48 depend from claim 31 and claims 37-38 depend from claim 36, which depends from claim 31. Claim 31 has been amended to recite "a cylindrical roll core having a central longitudinal axis; a first metal overlay formed on the roll core, the first metal overlay defining a plurality of cooling passages for conducting a cooling medium through the first metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core; and at least one additional metal overlay formed on the first metal overlay."

Amended claims 16 and 31 state that there must be at least one inlet passage and at least one outlet passage that extend substantially parallel to the central longitudinal axis of the roll core, that are in fluid communication with one another, and that are located within the sleeve. Paragraph 77 of the Applicants' application, states that the cooling inlet passage carries cool water down the length of the overlay (i.e. through the overlay) and the outlet cooling passage carries heated water up the length of the overlay in the opposite direction. The heated water is then expelled from the metal overlay by flowing through the "return" radial passages that are in fluid communication with the outlet passages located in the overlay.

In contrast, FIG. 1 of Perry does not disclose an overlay/sleeve that contains one passage that is used exclusively for delivering cool water through the sleeve and a second

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passage that is used exclusively to expel heated water from the sleeve. Nor does Perry disclose or suggest using at least one passage that is used exclusively for delivering cool water through the sleeve and at least one passage that is used exclusively for expelling heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve. Rather, Perry discloses only one passage that is used to deliver cool water through the sleeve and to expel the heated water from the sleeve. This flow path is described throughout the Perry '410 patent. For example, in column 3, lines 26-34, Perry discloses that "in use, liquid coolant, usually water, is passed along the space between the tube 34 and the bore 15 and into each of the bores 19 where it flows to the channel 17A at the interface between the sleeve and arbor. The water then flows along the bore 28 to the channel 23 extending around the adjacent end face of the sleeve." Another example is found in Column 3, lines 46-49, states that "from the channel 22 the water flows along the bore 27 to the annular channel 17B and then via the bores 21 to the annulus formed by the pipe and bore 15 on the opposite side of the seal 37 and through the tube 34." FIG. 3 of the Perry '410 patent shows a set of radial holes/passages being used to deliver cooling water through the sleeve while another set of radial holes/passages are being used to expel the heated water from the sleeve. Column 4, lines 11-18, which describes FIG. 3 states that "from the slot 41, the cooling water passes through a series of radial holes 42 to circumferential grooves 43 at the interface between the two sleeves where it splits into two directions to pass circumferentially around the sleeve structure until the two flows unite to exit by a second

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series of radial holes 44. The cooling water passes from radial holes 44 to a second slot 45 which is connected to the outlet hole 46 in the arbor 38 by radial bores 47."

However, unlike claim 16 of the Applicants' application, the holes/passages that cool the sleeve in FIG. 3 of the Perry '410 patent first extend radially from the longitudinal axis of the roll core (radial holes 42) then circumferential grooves 43 that travel around the circumference of the sleeve deliver the cool water around the circumference of the sleeve until the water is expelled.

This is in stark contrast to Applicants' amended claim 16 and 31 that recite that the cooling passages located in the overlay are substantially parallel to the longitudinal axis of the roll core. The slot 41 in FIG. 3 does not anticipate Applicants' amended claims 16 and 31 under 102(b) because unlike the Applicants' cooling passages that are located within the overlay, the slot 41 is not located within the sleeve/overlay but rather the slot 41 is located on the exterior surface of the roll core.

Because the Perry '410 patent does not disclose at least one inlet cooling passage used exclusively for delivering cool water through the sleeve and at least one outlet passage that is used exclusively to expel heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve, Applicants' respectfully submit that claims 16, 18-20, 30-32, 34-38 and 47-48 are in condition for allowance.

Legal Precedent Regarding 35 U.S.C. §103

Before addressing the rejections under 35 U.S.C. § 103, the Applicants would like to respectfully address legal precedent regarding § 103. Under § 103, a patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 if the subject matter sought to be patented and the prior art are such that the subject matter as a whole *would have been obvious* at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103(a). The language "obvious at the time the invention was made" has been held by the Courts to mean that it is inappropriate for the Examiner to use "hindsight" in determining obviousness. *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082 (Fed. Cir. 1985). The Court in *In re Vaeck* held that "a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (i) whether there is some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings and (ii) whether the prior art would have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. Both the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure". *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

**Rejection of Claims 8-9, 11-12 and 14-15 under 35 U.S.C. 103(a)**

In paragraph 6 of the Office Action, the Examiner has rejected claims 8-9, 11-12 and 14-15 under 35 U.S.C. 103(a) as being unpatentable over the Frischknecht '444 patent in view of the Griffon '042 patent. Specifically, the Examiner argues that it would have been obvious to one having ordinary skill in the art to provide the Frischknecht '444 patent the use of at least one centrally located inlet and outlet passage and a plurality of radially extending passages that are perpendicular to the at least one centrally located inlet and outlet passage as taught by the Griffon '042 patent.

Claims 8 and 11 depends from claim 1. Claims 9 depends from claim 8, which depends from claim 1. Claims 12, 14-15 depend from claim 11, which depends from claim 1. As amended, claim 1 recites "a cylindrical roll core having a central longitudinal axis and defining a plurality of longitudinally extending cooling passages for conducting a cooling medium through the roll core to cool the roll during use, the cooling passages being located within the interior of the roll core; and at least one metal overlay formed on the roll core."

As stated in more detail in the "Rejection of Claims 1-7 under 35 U.S.C. 102(b)" section above, the Frischknecht '444 patent discloses the cooling grooves as being located on the exterior surface of the roll core. This configuration is seen in FIG. 6 of Frischknecht, which shows the cooling grooves 78 as being on the exterior surface of the roll core 66. Column 4, lines 65-68, of Frischknecht state that "the cooling medium is carried radially into the surface area in a closed loop, where it is guided in circumferential

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cooling grooves 74 in roll core 66, delimited by roll jacket 68." In contrast, the exterior surface of Applicants' roll core/roll body is smooth. In paragraph 58 of the Applicants' application it is stated that "the surface 31 of the roll body 18 is preferably free of grooves and channels, such as those that are generally found in prior art caster rolls. The first metal overlay 14 is formed on top of the relatively smooth surface 31 (i.e. free of grooves and channels) of the roll body 18." Because the Frischknecht '444 patent discloses the longitudinal running cooling grooves as being located on the exterior surface of the roll core as opposed to Applicant's amend claim 1 that recites the cooling passages as being located within the interior of the roll core, Applicants' respectfully submit that the Frischknecht '444 patent should not be used to reject claims 8-9, 11-12 and 14-15 under 103(a) and that claims 8-9, 11-12 and 14-15 are in condition for allowance.

Additionally, the Griffon '042 patent should not be used to reject Applicants' claims under 103(a) because Griffon, like Frischknecht, also teaches a roll body with cooling passages located on the exterior surface of the roll body/roll core, which is in contrast to Applicants' amended claim 1 that recites the cooling passages as being within the interior of the roll core. Support for showing that the cooling passages in Griffon are on the exterior of the roll body is found in Claim 1 of the Griffon '042 patent. Claim 1 of Griffon recites a "roll body for a continuous casting machine able, in its central part the so-called rolling zone, to carry a cylindrical shell and comprising...a plurality of distribution collectors recessed into said outer surface and having a first depth, a plurality of evacuation collectors recessed into said outer surface..." Further support for showing

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that the location of the cooling passages are on the surface of the roll body is found in column 3, lines 55-57, of the Griffon '042 patent that state that "FIG. 4 gives a flat view, for a roll body of the invention, of that part of the surface of the roll body positioned below the shell." FIGS. 5a and 5b of the Griffon '042 patent is described in column 3, lines 58-60, as showing two cross-section views of a roll body. As can be seen in FIGS. 5a and 5b, the ring channels 90 and collectors 8301, 7101, 8101, 7201, 8201, and 7301 are located on the surface of the roll body. FIGS. 6a and 6b of Griffon are longitudinal sections of the roll body and depict the channels 90 and collectors 70 as being located on the surface of the roll body 110.

Because both the Frischknecht '444 patent and the Griffon '042 patent disclose a roll body/roll core with cooling channels located on the exterior surface of the roll body/roll core, Applicants' respectfully submit that both prior art references teach away from Applicants' invention and should not be used to reject Applicants' claims under 103(a). Therefore, Applicants submit that claims 8-9, 11-12 and 14-15 are in condition for allowance.

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**Rejection of Claims 10 and 13 under 35 U.S.C. 103(a)**

In paragraph 7 of the Office Action, the Examiner has rejected claims 10 and 13 under 35 U.S.C. 103(a) as being unpatentable over the Frischknecht '444 patent in view of the Griffon '042 patent and further in view of the Hawes '535 patent. Specifically, the Examiner argues that it would have been obvious to one having ordinary skill in the art to provide Frischknecht in view of Griffon the use of a plurality of radially extending passages that connect to the centrally located inlet and outlet passages at an acute angle wherein the end of the passages are closed with end caps as taught by Hawes.

Claim 10 depends from claim 8, which depends from claim 1. Claim 13 depends from claim 11, which depends from claim 1. Amended claim 1 recites "a cylindrical roll core having a central longitudinal axis and defining a plurality of longitudinally extending cooling passages for conducting a cooling medium through the roll core to cool the roll during use, the cooling passages being located within the interior of the roll core; and at least one metal overlay formed on the roll core."

As stated in more detail in the "Rejection of Claims 1-7 under 35 U.S.C. 102(b)" section above, the Frischknecht '444 patent discloses the cooling grooves as being located on the exterior surface of the roll core. As stated in the "Rejection of Claims 8-9, 11-12 and 14-15 under 35 U.S.C. 103(a)" section above, the Griffon '042 patent also teaches a roll body with cooling passages located on the exterior surface of the roll body. Therefore, Applicants respectfully submit that claims 10 and 13 are in condition for allowance because amended claim 1 recites that the cooling passages are located within

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the interior of the roll core as opposed to the cooling passages that are located on the exterior of the roll body/roll core as disclosed in the Frischknecht '444 and Griffon '042 patents.

**Rejection of Claims 23-24, 26-27, 29, 39-40, 42-43 and 45-46 under 35 U.S.C. 103(a)**

In paragraph 8 of the Office Action, the Examiner has rejected claims 23-24, 26-27, 29, 39-40, 42-43 and 45-46 under 35 U.S.C. 103(a) as being unpatentable over the Perry '410 patent in view of the Griffon '042 patent. Specifically, the Examiner argues that it would have been obvious to one having ordinary skill in the art to provide Perry the use of a plurality of radially extending passages that connect to the centrally located inlet and outlet passages as taught by Griffon.

Claims 23-24, 26, and 29 depend from claim 16 and claim 27 depends from claim 26, which depends from claim 16. Amended claim 16 recites "a cylindrical roll core having a central longitudinal axis; a metal overlay formed on the roll core, the metal overlay defining a plurality of cooling passages for conducting a cooling medium through the metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core."

As stated in more detail in the "Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b)" section above, the Perry '410 patent does not disclose at least one inlet

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cooling passage that is used exclusively for delivering cool water through the sleeve and at least one outlet cooling passage that is used exclusively for expelling heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve. Therefore, Applicants respectfully submit that claims 23-24, 26-27, and 29 are in condition for allowance because amended claim 16 recites at least one inlet cooling passage and at least one outlet cooling passage located within the overlay and being substantially parallel to the longitudinal axis of the roll core while the Perry '410 patent does not disclose such a configuration.

Claims 39-40, 42-43 and 45-46 depend from claim 31. Amended claim 31 recites "a cylindrical roll core having a central longitudinal axis; a first metal overlay formed on the roll core, the first metal overlay defining a plurality of cooling passages for conducting a cooling medium through the first metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core; and at least one additional metal overlay formed on the first metal overlay."

As stated in more detail in the "Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b)" section above, the Perry '410 patent does not disclose at least one inlet cooling passage that is used exclusively for delivering cool water through the sleeve and at least one outlet cooling passage that is used exclusively to expel heated water from the

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sleeve that extend substantially parallel to the longitudinal axis of the roll core.

Therefore, Applicants respectfully submit that claims 39-40, 42-43 and 45-46 are in condition for allowance because amended claim 31 recites at least one inlet cooling passage and at least one outlet cooling passage located within the overlay and being substantially parallel to the longitudinal axis of the roll core.

**Rejection of Claims 25, 28, 41 and 44 under 35 U.S.C. 103(a)**

In paragraph 9 of the Office Action, the Examiner has rejected claims 25, 28, 41 and 44 under 35 U.S.C. 103(a) as being unpatentable over the Perry '410 patent in view of the Griffon '042 patent and in further view of the Hawes '535 patent. Specifically, the Examiner argues that it would have been obvious to one having ordinary skill in the art to provide Perry in view of Griffon the use of a plurality of radially extending passages that connect to the centrally located inlet and outlet passages at an acute angle wherein the end of the passages are closed with end caps as taught by Hawes.

Claim 25 depends from claim 23 that depends from claim 16. Claim 28 depends from claim 26 that depends from claim 16. Amended claim 16 recites "a cylindrical roll core having a central longitudinal axis; a metal overlay formed on the roll core, the metal overlay defining a plurality of cooling passages for conducting a cooling medium through the metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage

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being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core."

As stated in the "Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b)" section above, the Perry '410 patent does not disclose at least one inlet cooling passage that is used exclusively for delivering cool water through the sleeve and at least one outlet cooling passage that is used exclusively to expel heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve. Therefore, Applicants' respectfully submit that claims 25 and 28 are in condition for allowance because amended claim 16 recites at least one inlet cooling passage and at least one outlet cooling passage located within the overlay being substantially parallel to the longitudinal axis of the roll core while the Perry '410 patent does not disclose such an orientation for the cooling passages located within the sleeve.

Claim 41 depends from claim 39, which depends from claim 31. Claim 44 depends from claim 42, which depends from claim 31. Amended claim 31 recites "a cylindrical roll core having a central longitudinal axis; a first metal overlay formed on the roll core, the first metal overlay defining a plurality of cooling passages for conducting a cooling medium through the first metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis

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of the roll core; and at least one additional metal overlay formed on the first metal overlay."

As stated in more detail in the "Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b)" section above, the Perry '410 patent does not disclose at least one inlet cooling passage that is used exclusively for delivering cool water through the sleeve and at least one outlet cooling passage that is used exclusively to expel heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve. Therefore, Applicants' respectfully submit that claims 41 and 44 are in condition for allowance because amended claim 31 recites at least one inlet cooling passage and at least one outlet cooling passage located within the overlay and being substantially parallel to the longitudinal axis of the roll core while the Perry '410 patent does not disclose such an orientation for the cooling passages located within the sleeve.

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Rejection of Claim 49 under 35 U.S.C. 103(a)

In paragraph 10 of the Office Action, the Examiner has rejected claim 49 under 35 U.S.C. 103(a) as being unpatentable over the Perry '410 patent in view of the Fukubayahi '689 patent. Specifically, the Examiner argues that it would have been obvious to one having ordinary skill in the art to provide Perry the use of a multilayer coated on the cooling roll with a steel-nickel-cobalt alloy as taught by Fukubayashi.

Claim 49 depends from claim 31. Amended claim 31 recites, "a cylindrical roll core having a central longitudinal axis; a first metal overlay formed on the roll core, the first metal overlay defining a plurality of cooling passages for conducting a cooling medium through the first metal overlay to cool the roll during use; the cooling passages comprising at least one inlet cooling passage and at least one outlet cooling passage; the inlet cooling passage being in fluid communication with the outlet cooling passage; the cooling passages extend substantially parallel to the central longitudinal axis of the roll core; and at least one additional metal overlay formed on the first metal overlay."

As stated in more detail in the "Rejection of Claims 16-22, 30-38 and 47-48 under 35 U.S.C. 102(b)" section above, the Perry '410 patent does not disclose at least one inlet cooling passage that is used exclusively for delivering cool water through the sleeve and at least one outlet cooling passage that is used exclusively to expel heated water from the sleeve that extend substantially parallel to the longitudinal axis of the roll core and that are located within the sleeve. Therefore, Applicants' respectfully submit that claim 49 is in condition for allowance because amended claim 31 recites at least one inlet cooling

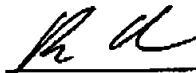
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passage and at least one outlet cooling passage located within the overlay and being substantially parallel to the longitudinal axis of the roll core while the Perry '410 patent does not disclose such an orientation for the cooling passages located within the sleeve.

In view of the foregoing amendments and remarks, Applicants' respectfully submit that claims 1-16, 18-32, and 34-50 are patentable over the cited references. Accordingly, an early notice of allowance of this application is respectfully requested.

In the event that any outstanding matters remain in connection with this application, the Examiner is invited to telephone the undersigned at (724) 337-1221 to discuss such matters.

Respectfully submitted,



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